

REMARKS

Claims 1-18 and 20-22 are pending in the application. Claims 4, 6, 15-18 and 22 were withdrawn from consideration as drawn to non-elected inventions. Claims 1-3, 5, 7-14, 19-21 and 23 were rejected. Claims 19 and 13 have been canceled, without prejudice.

Specification

The objections to the disclosure are noted. The requested corrections have been made and the references to the various US patent applications have been updated by amendment as appropriate.

Claim objections and rejections under 35 U.S.C. §§112 and 101

Claims 19 and 23 were rejected under 37 CFR 1.75(c). Without addressing the merits of these rejections, claims 19 and 23 have been canceled, without prejudice, in order to simplify the issues for the current prosecution in hopes of expediting prosecution of aspects of the claimed invention believed allowable in view of the outstanding rejections.

Claim 9 was rejected under 35 U.S.C. 101. Based on the statement of rejection, it is believed that the Examiner intended to refer to claim 19 in this rejection. As noted above, that claim has been canceled, without prejudice, and so this rejection is believed to be obviated.

Claim 20 was rejected under 35 U.S.C. 112, first paragraph as being non-enabling. It is respectfully asserted that a sufficient number of materials have been disclosed together with the functional characteristics required for a suitable material to enable one skilled in the art to discern suitable materials for the bonding layer. Nevertheless, claim 20 has been amended to recite only those materials listed in the specification, namely a lithium bonding coat of a thin layer of Ag, Al, Sn or other Li alloy-forming metal. Support for this amendment to claim 20 can be found at page 7, lines 3-6, for example. Withdrawal of the rejection in view of this amendment is respectfully requested.

Claims 1-3, 5, 7-14, 19-21 and 23 were rejected under 35 U.S.C. 112, second paragraph as being indefinite. With regard to the use of the term “fuel cell,” while Applicants believe that the described and claimed cells may be appropriately characterized as such, there is no objection to use of the more general term “electrochemical cell” and the claims have been amended accordingly, consistent with the Examiner’s suggestion. Claims 10 and 11 have been amended to more clearly recite that which is intended to be claimed in proper Markush form. Claim 19 has been canceled, as noted above. Withdrawal of the rejections is therefore respectfully requested.

Claim rejections under 35 U.S.C. §102 (Visco)

Claims 1-5, 7-14, 19-21 and 23 were rejected under 35 U.S.C. §102(e) as being anticipated by commonly assigned US 2004/0197641 of Visco et al. (Visco).

Independent claim 1, as currently amended, recites:

An electrochemical cell, comprising:

a renewable active metal anode, configured for supplementation of the active metal;

a cathode structure comprising an electronically conductive component, an ionically conductive component, and a fluid oxidant;

an ionically conductive protective membrane on the first surface of the anode, the membrane comprising,

one or more materials configured to provide a first surface chemically compatible with the active metal of the anode in contact with the anode, and a second surface substantially impervious to and chemically compatible with the cathode structure and in contact with the cathode structure.

The other pending claims depend directly or indirectly from independent claim 1 and thus incorporate this recitation. The recited active metal anode is a renewable active metal anode that is configured for supplementation of the active metal. The cell has, in addition to the renewable active metal (e.g., lithium) anode, a cathode structure that includes an electronically conductive component (e.g., a porous metal or alloy), an ionically conductive component (e.g., an electrolyte), and a fluid oxidant (e.g., air, water or a peroxide or other aqueous solution). The pairing of an active metal anode with a cathode oxidant in the cell is enabled by an ionically conductive protective membrane on the surface of the anode facing the cathode. The active metal anode is renewable in that it is configured for supplementation of the active metal to provide a fuel supply for continuous operation of the cell for as long as desired. Since there are consumable reactants on both the anode and cathode sides of the ionically conductive protective membrane, the cell is referred to in the disclosure as a fuel cell. The anode “fuel” may be in the solid or liquid phase. The cathode structure includes an electronically conductive component (e.g., a porous metal or alloy), an ionically conductive component (e.g., an electrolyte), and a fluid oxidant (e.g., air, water or a peroxide or other aqueous solution). Advantageously, the cathode structure may include fluid oxidants that are obtained from the cell’s operating environment, such as air or fresh or salt water.

Visco describes and claims battery cells and associated structures and methods having anode protective structures developed by PolyPlus Battery Company, the common assignee of both applications. Visco recites battery and other electrochemical cells having active metal anodes. However, there is no teaching or suggestion of the recited renewable active metal anode, configured for supplementation of the existing active metal prior to the effective date of the current application. Visco is only available as a reference against the present application under §102(e) only to the extent that Visco or an application from which Visco claims priority discloses the subject matter relied upon in the rejection and predates the effective filing date of the present application. The present application claims priority to Provisional application 60/518,948 filed November 10, 2003 and Provisional application 60/529,825 filed December 15, 2003. Visco was filed February 3, 2004. It is respectfully submitted that the present claims are amply supported by at least Provisional application 60/529,825 filed December 15, 2003, predating the Visco filing. And the earliest disclosure of a “fuel cell” type electrochemical cell in the present context is in Provisional application 60/518,948 filed November 10, 2003, to which both the present application and Visco claim priority. Thus, it is respectfully submitted that Visco is not available as a §102(e) reference against the present application for this aspect. Accordingly, it is respectfully submitted that Visco does not anticipate the present claims and withdrawal of the §102(e) rejection on this basis is respectfully requested.

Claim rejections under 35 U.S.C. §§ 102 and 103 (JP ‘471)

Claims 1, 3-4, 9 14 and 19 were rejected under 35 U.S.C. §102(b) as being anticipated by JP 55-081471 A (JP ‘471). Claims 2, 7 and 10-12 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP ‘471 in view of US 5,314,765 to Bates (Bates ‘765). Claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over JP ‘471 in view of US 3,976509 to Tsai (Tsai). Claim 13 was rejected under 35 U.S.C. §103(a) as being unpatentable over JP ‘471 in view of Bates, and further in view of US 6,485,622 to Fu (Fu).

As noted above, the pending claims relate to an electromchemical cell having a renewable active metal anode that is configured for supplementation of the existing active metal of the anode. JP ‘471, to the extent that the disclosure can be understood from the English language abstract, clearly relates to a battery cell, and thus is understood not to teach or suggest the renewable active metal anode configured for supplementation of the active metal of the claimed invention. With particular relevance to the claimed invention, JP ‘471 illustrates and seems to describe a battery cell that is closed and sealed on the anode side. Such a configuration is respectfully submitted to not be renewable and configured for supplementation of the active metal of the anode as described and claimed herein. Claim 1 has been amended to clarify and emphasize this aspect of the claimed invention. Accordingly, it is respectfully submitted that claim 1 is not anticipated by JP ‘471. The remaining claims are dependent on claim 1 and thus incorporate all of its limitations, and are therefore submitted to be allowable for at least the same

reasons. Withdrawal of the rejections under 35 U.S.C. 102(b) is thus respectfully requested. Moreover, with regard to the various rejections under 35 U.S.C. 103(a), the secondary references are respectfully submitted not to cure the noted deficiency of JP ‘471 with regard to the claimed invention, and withdrawal of the rejections under 35 U.S.C. 103(a) is thus also respectfully requested.

Double Patenting

Claims 1-3, 5, 7-14, 19 and 23 are provisionally rejected on the ground of obviousness-type double patenting over claims of co-pending, commonly assigned application 10/772,157 of Visco et al. (“Visco”). This rejection is respectfully traversed.

As noted above, the presently pending claims recite, in relevant part, “a renewable active metal anode, configured for supplementation of the active metal...” [emphasis added]. The noted claims of Visco recite battery and other electrochemical cells having active metal anodes. However, the claims lack any teaching or suggestion of the recited renewable active metal anode, configured for supplementation of the active metal. Accordingly, it is respectfully submitted that the presently pending claims are not rendered obvious by the claims of Visco, and withdrawal of the obviousness-type double patenting rejection on this basis is respectfully requested.

Should it be ultimately necessary, Applicants propose to file Terminal Disclaimers in one or more of these applications, as appropriate, in order to obviate any remaining obviousness-type double patenting issues prior to the conclusion of prosecution.

Conclusion

Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below. If any further fees are due in connection with the filing of this amendment, the Commissioner is authorized to charge such fees to Deposit Account 500388 (Order No. PLUSP038).

Respectfully submitted,
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